Ghana Government eGIF Implementation Plan

ABBREVIATIONS

Term	Definition
e-GIF	E-Government Interoperability Framework
EA	Enterprise Architecture
MDA	Ministries Departments and Agencies
GICTeD	Ghana Information and Communication Technology Directorate
GoG	Government of Ghana
CMM	Capability Maturity Model
SDLC	Systems Development Life Cycle

Table of Contents

1. Introduction

The e-Government Interoperability Framework (eGIF) implementation plan report serves as the strategic framework for implementing policies and technical standards across government. The main thrust of the e-GIF is to adopt best practice standards such as the Internet, Web Services, XML and XSL as the core standards for data integration and management. This includes the definition and central provision of XML schemas for use throughout the Ministries Departments and Agencies (MDAs). The eGIF also sets out policies for establishing and implementing metadata across the public sector, which will help citizens find government information and resources more easily. Stipulating policies and specifications is not enough in itself. Successful implementation will mean the provision of support, best-practice guidance, toolkits (such as the Web site) and centrally agreed schemas.

The purpose of the report is to define how the Government of Ghana (GoG) through a central authority (e.g. GICTeD) will implement eGIF throughout the public sector. The main objective of the report is to provide a guide to planning for eGIF implementation by the central body but it does not provide any specific dates for implementation but just broad guidelines on the high level activities necessary for its implementation.

2. The Implementation Plan

The aim of the GoG eGIF will not be achieved overnight. The implementation needs to be managed as a long-term, ongoing initiative and must therefore be supported by robust processes. These processes include the roles and responsibilities of key stakeholders, committees, management and working groups outlined in the assessment document. It also includes the confirmation of the level of non compliance, deploying the eGIF Web site to store the artefacts and providing technical training for the implementation of eGIF at the various organisations.

Figure 1: High eGIF Implementation Plan
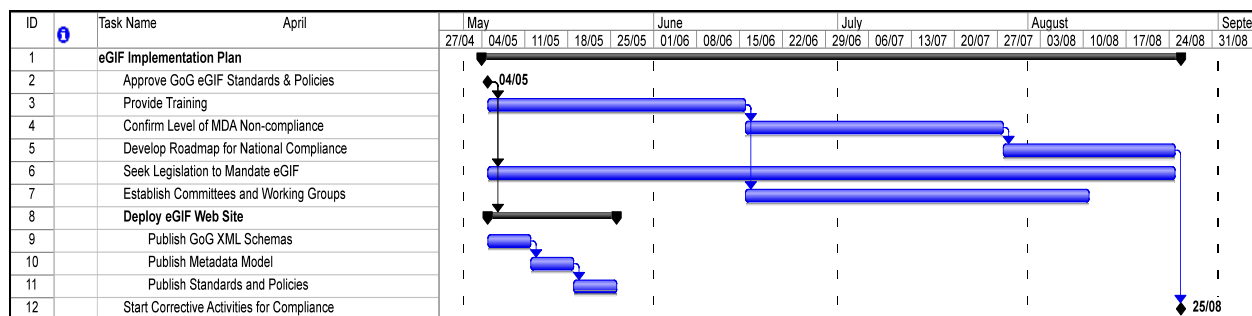
As illustrated in figure 1 above the eGIF implementation is based on the following high level activities:

2.1. Approve eGIF Standards and Policies

The eGIF documents are expected to be approved by the central government authority (GICTED) for adoption. The documents are expected to go through agreed review processes with stakeholders to ensure acceptance prior to national adoption.

2.2. Provide Training

Architects and ICT Directors are expected to be trained in the use of the eGIF standards and policies for their technology deployments. The central government authority will develop a training programme for MDAs' technical staff to ensure they are fully conversant with use of the eGIF. The authority is also expected to provide public awareness of the importance of eGIF and the need for compliance. The initial training for Architects will be provided by Lenoxx & Netwise but in the long term, the central authority is expected to develop a broad national awareness campaign and training for all stakeholders.

Continual engagement of all our stakeholders in the development and implementation of the eGIF is fundamental to the success of its implementation in Ghana. MDAs, citizens and businesses must all be encouraged to comment and suggest ways of improving the strategy and to provide support and implementation of the eGIF. This could be achieved by ensuring there is a widespread training programme and the general public is aware of the use of eGIF.

2.3. Confirm Level of MDA e-Applications Non Compliance

During the start of the GGEA and eGIF projects data on the current MDA ICT environments was captured to understand their technology landscape. The analysis of the environments of the respondents (about 50 MDAs) of the questionnaire suggests that there is no full compliance across the MDAs. For example none of the MDAs uses Web Services and XML for data interchange, which is the key driver for eGIF interoperability. Experience suggests that none of the non-respondents is likely to have full eGIF compliance and therefore must therefore use the Enterprise Architecture implementation process to achieve eGIF compliance. This will mean the removal of obsolete technologies and applications.

Government legislation may be required for the enforcement of eGIF standards and policies in Ghana and the law must clearly determine the date for MDAs to start the process of implementing the required structures in their organisations for eGIF compliance. The adoption of eGIF should be an integral part of the MDAs plans to participate in electronic government and as such Chief Directors and senior officials of the MDAs must integrate eGIF implementation requirements into their future strategic plans.

It is expected that all MDAs will adopt the eGIF on the following basis:

> Current technologies, applications and information systems do not need to immediately comply with the Ghana Government eGIF;

> MDAs will use the Ghana Government Enterprise Architecture framework to drive their interoperability implementation plans;

> From a defined date by the government, all new information systems, applications, interfacing and communications technologies deployed by MDAs (or current instances of systems being redeveloped or replaced) must comply with the eGIF except in instances where:

> > o Interoperability is not considered by the MDA as a requirement for a given technology solution; or

o the current version of the eGIF does not include policies and standards on the technologies the MDA wants to deploy; or

o an alternative approach to achieving interoperability is justified;

Where an MDA has justifiable reason to be exempted from eGIF compliance it must:

o Demonstrate to GICTeD or (the central standards authority) that the current eGIF version cannot meet given requirements or why an alternative approach to achieving interoperability is justified;

o Provide suggestions for necessary changes to the eGIF.

Exemptions will only apply to a specific system or technology but not the entire ICT environment and business processes of the MDA;

Specialist systems deployed by the security and intelligence services are automatically exempted where compliance with the eGIF is considered inappropriate;

The action plan for migrating e-applications is based on the following scenarios:

eGIF Implementation in "Greenfield" environments:

Legacy environments.

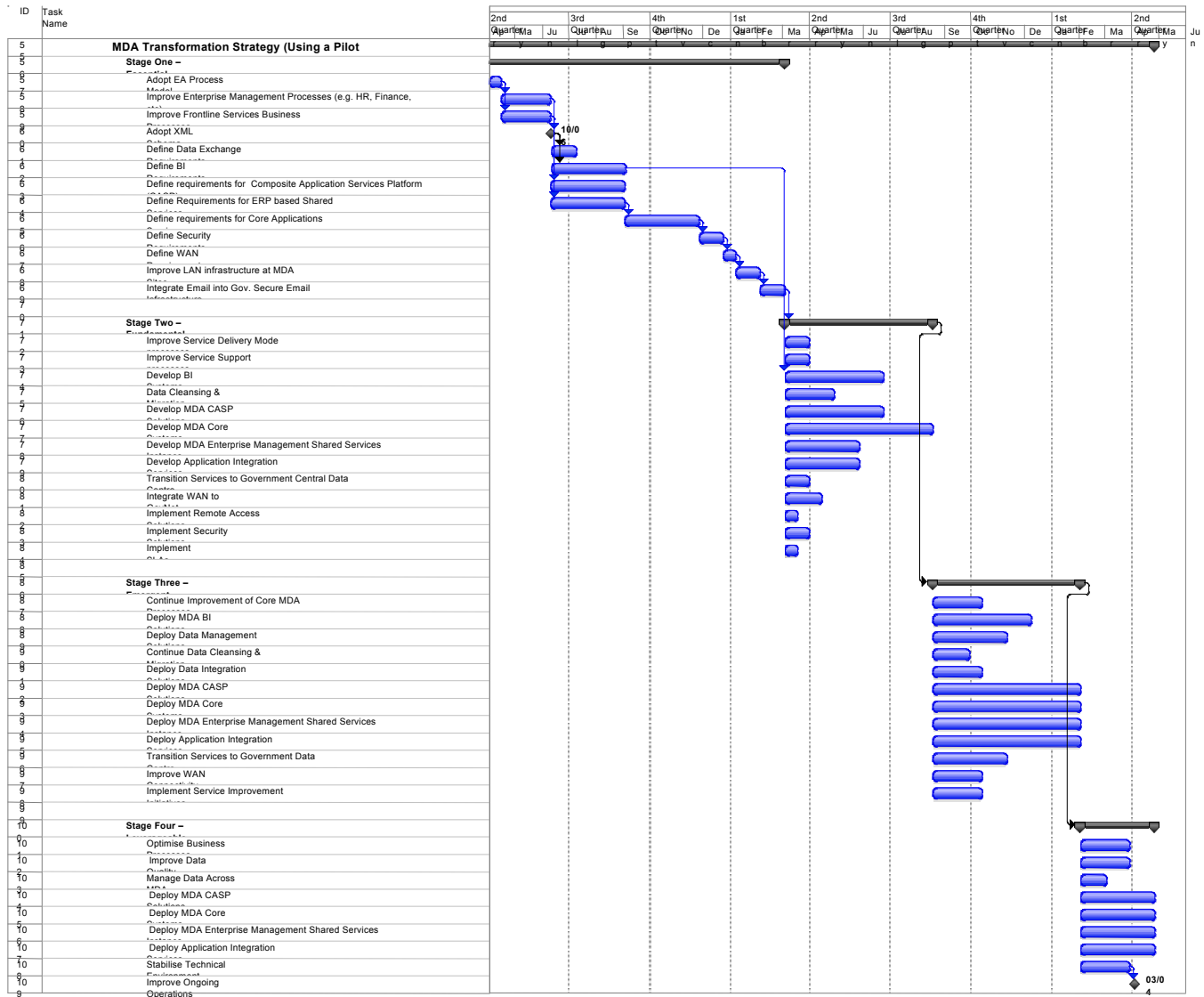## 2.3.1. eGIF Implementation in 'Greenfield' Environments

Over 90% of the MDAs assessed could be categorised as 'greenfield', with little or no ICT infrastructure in place. There is no architecture and MDAs in this category are yet to deploy any major applications to automate their business processes and have no technologies in place to exchange data automatically within or across MDAs. Our analysis of the Ghana public sector ICT environment suggests that these MDAs will have to adopt the Ghana Government Enterprise Architecture (GGEA) framework and the implementation guide to meet their eGIF requirements.

It is recommended that MDAs considered as 'greenfield' sites adopt the GGEA implementation methodology, which provides a logical, step by step approach to implementing the Enterprise Architecture (EA) and defining the necessary technologies. MDAs are expected to comply with the eGIF standards and policies when implementing their EAs. The GGEA delivery model will take MDAs through a maturity process as the technologies are implemented. The different stages of the model are:

Stage 1 – this stage involves adoption of the EA by the MDA and definition of applications, data and infrastructure requirements for implementation. This stage also involves the implementation of the critical processes and structures necessary to position the MDA within the leveraged applications delivery structure. It is expected that the MDAs eGIF requirements are established at this stage.

Stage 2 (6 – 12 months) – this stage involves establishing basic operating requirements and transitioning services to the government shared infrastructures and the customisation of application services for the MDA. eGIF requirements must be established and incorporated into the design of systems.

Stage 3 (12 – 24 months) – involves the deployment of the necessary technologies for the MDA and evolving organisational processes. All systems are eGIF compliant and the MDA participates in compliance reviews.

Stage 4 (24 months +) - eGIF adoption is complete and MDA is able to interoperate effectively using appropriate standards and policies.

ID	Task Name
	MDA Transformation Strategy (Using a Pilot
	Stage One – Foundation
	Adopt EA Process Model
	Improve Enterprise Management Processes (e.g. HR, Finance, etc.)
	Improve Frontline Services Business Process
	Adopt XML Schema
	Define Data Exchange
	Define BI Requirements
	Define requirements for Composite Application Services Platform (CASP)
	Define Requirements for ERP based Shared Services
	Define requirements for Core Applications
	Define Security Requirements
	Define WAN
	Improve LAN infrastructure at MDA Sites
	Integrate Email into Gov. Secure Email Infrastructure
	Stage Two – Fundamental Improvement
	Improve Service Delivery Mode
	Improve Service Support Processes
	Develop BI Capabilities
	Data Cleansing & Migration
	Develop MDA CASP Solution
	Develop MDA Core Systems
	Develop MDA Enterprise Management Shared Services Instance
	Develop Application Integration Services
	Transition Services to Government Central Data Centre
	Integrate WAN to Gov Net
	Implement Remote Access Solution
	Implement Security Solutions
	Implement SLAs
	Stage Three – Emergent
	Continue Improvement of Core MDA Processes
	Deploy MDA BI Solution
	Deploy Data Management Solution
	Continue Data Cleansing & Migration
	Deploy Data Integration Solution
	Deploy MDA CASP Solution
	Deploy MDA Core Systems
	Deploy MDA Enterprise Management Shared Services Instance
	Deploy Application Integration Services
	Transition Services to Government Data Centre
	Improve WAN Connectivity
	Implement Service Improvement Initiatives
	Stage Four – Innovating state
	Optimise Business Processes
	Improve Data Quality
	Manage Data Across MDA
	Deploy MDA CASP Solution
	Deploy MDA Core Systems
	Deploy MDA Enterprise Management Shared Services Instance
	Deploy Application Integration Services
	Stabilise Technical Environment
	Improve Ongoing Operations

Figure 1: EA Implementation Maturity Plan

Figure 1 above illustrates that as MDA's progress through the stages in the EA implementation maturity process, eGIF policies and standards must be applied by the agencies. For instance MDAs in stage one of the capability maturity processes has to adopt the EA and define applications, data infrastructure for implementation. In defining them the XML schema, which has been define in the eGIF should be the underlying mechanism used by applications for data interchange and integration.

As the MDAs Enterprise Architecture implementations mature, the alignment with the eGIF will occur as part of the normal cycle of systems and software upgrading, and introduction or revision of functions and business processes. MDAs with the requirement to deploy new systems are expected to go through GICTeD for proper scrutiny to make sure that no element of the system to be deployed conflicts with the EA and e-GIF principles. The effect of this approach will be that across time, and driven by operational requirements, interoperability will become the norm in government not the exception. It will also mean that agencies will not be able to participate effectively unless they align with the eGIF.

2.3.2. eGIF Implementation In Legacy Environments

Some MDAs have legacy systems, which may run on old non-eGIF compliant technologies but yet are vital to the organization in the discharge of their duties. Such systems despite the fact that they may not be eGIF compliant cannot be discarded immediately due to:

Cost of implementing new systems: new systems are usually introduced at a cost. The cost is for hardware, development of applications whether built in-house or off the shelf, training, support staff, etc. If existing systems are working satisfactorily, and MDAs see no reason for changing them, re-learning a new system would have a prohibitive attendant cost in lost time and money, which the MDAs usually don't have.

Role of the system in the organisation: Some systems are vital and key to the performance of the MDA because of the tasks and roles they perform. Even if such systems run on obsolete or non-eGIF complaint technologies changing them could be a big hurdle for the organisation because of impact on service delivery, which could be detrimental to the MDA and the government of Ghana in short to medium term.

Budget constraint: implementation of EA and eGIF comes at a cost to the MDA itself. Apart from the shared infrastructure and application services, MDAs are expected to build their own applications in conformance with the EA and the eGIF. Some MDAs may struggle to raise funds for the technology projects.

Resistance to change: in situations where staffs of MDAs are resistant to change it will be difficult for any sort of change regardless of the organisation's compliance obligations. MDAs have a specific way of doing things and what they stand for. Implementing new systems may seem to be a breach of organisational culture and attitude and that may affect productivity and the delivery of services to citizens.

Fear: introduction of new ways of doing things creates a sense of job insecurity and the fear of getting things done wrongly. Implementing eGIF could mean that certain changes may have to be made and business process re-engineered, which could generate fear among some of the employees.

The above reasons might suggest that legacy systems cannot be discarded; nonetheless it is still important that eGIF is implemented across MDAs in order to meet the goal of interoperability in government. We recommend two main approaches for the implementation of eGIF in legacy environments:

Wait until technology refresh approach;

Technology bridging approach.

2.3.3. WAIT UNTIL TECHNOLOGY REFRESH APPROACH

This approach recommends that systems be allowed to go through their lifecycle to the period where they must be refreshed for eGIF compliance. Technology refresh cycle is the time in between the replacements of technologies. With this approach requires the MDA to wait until the existing non-compliant systems exhaust their refresh cycle and then they will be replaced with new systems that are eGIF compliant. Other events which can also trigger technology refresh:

Technical problems: this is when the software or hardware encounters a problem in the course of its operations and begins to malfunction or ceases to function. The MDA has no other choice than to replace that software or hardware for work to progress then in the process ensure the new systems are developed to eGIF compliant.

Growth in business volumes: as the number of citizens and employees who access services from a particular MDA increases, transaction volumes of the MDA will increase. If the existing systems lack scalability and agility, the increasing transaction volumes could affect the performance of the systems and this may call for a replacement of the systems to handle the large volumes of transactions. The new system will then be designed to meet eGIF and other non-functional requirements.

Vendor specified refresh: Vendors of software products can also trigger a refresh. Some vendors may cease to offer technical support and advisory services for MDA clients. In that case the MDA will not have a choice but to replace the system or upgrade to a supported version. The MDA will then ensure that the new version is eGIF compliant.

New industry trends, standards or paradigm shifts: Changing industry standards, trends and ways of doing things triggers a refresh (and possibly changes to eGIF standards). For an MDA to want to apply these new trends, the legacy systems may have to be decommissioned and replaced with modern systems which have the needed technological capabilities that meet eGIF specifications.

2.3.4. IMPLEMENTING eGIF USING A BRIDGING APPROACH

This approach recommends the use of middleware technologies to transform data and information from one platform onto another. Our analysis of over 50 MDAs suggests that none of their existing legacy systems is XML based, which makes them non-compliant to eGIF standards at this stage. There is a need to convert the various flat files to XML and SQL to XML to achieve compliance. The issue is that the applications will require a lot of changes to make them compliant. The bridging approach using a middleware could be used for the conversion. Data integration and interchange is the most critical requirement for eGIF implementation and it is accepted that not all systems will be required to be directly XML enabled and where appropriate it is acceptable to use middleware as a bridging mechanism as illustrated figure 2 below.
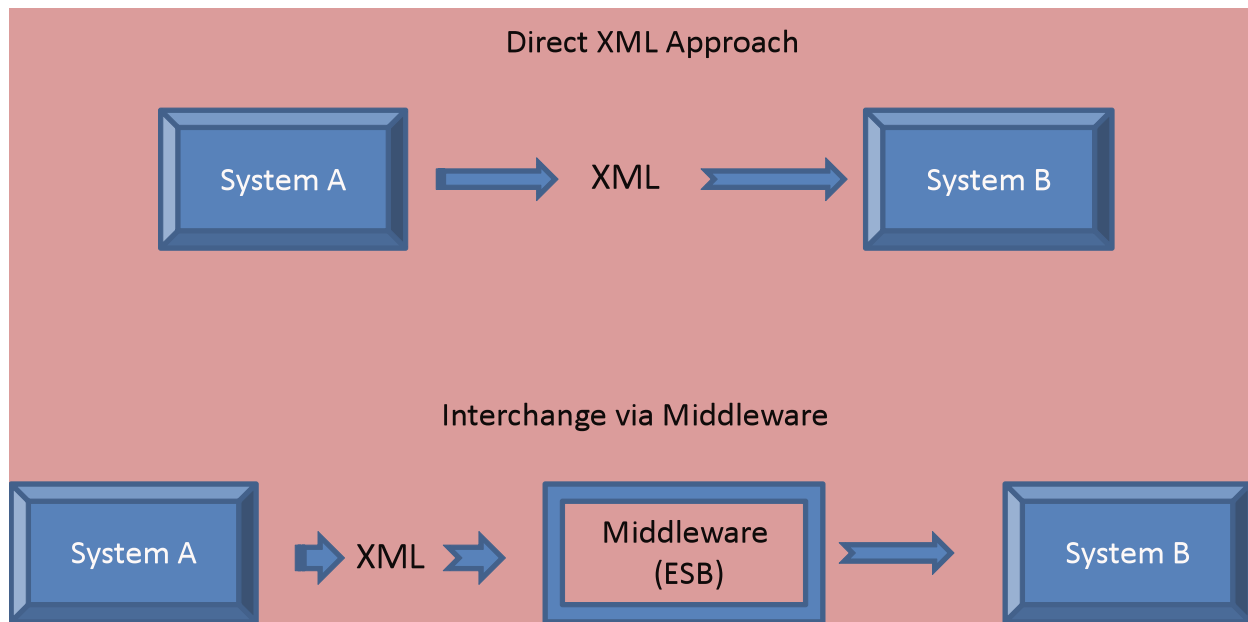
Figure 2: Data Interchange Approaches

The diagram presents different options for the MDAs to achieve data interchange. It is must be noted that it is a requirement that all new systems strive to use the direct XML model as shown in the diagram for eGIF compliance but the adoption of the Enterprise Service Bus (as recommended in GGEA) coupled with certain technologies such as the XSLT could be used to achieve this purpose. The Enterprise Service Bus (ESB) is a technology, which provides an abstraction layer on top of systems allowing systems to be interoperable and communicate. MDAs are expected to develop their Enterprise Architectures based on the GGEA framework and as such will be expected to deploy and ESB, which will enable applications that are not interoperable to communicate on a common platform via the ESB, which is the middleware acting as an intermediary between applications. For example applications that do not use the XML schemas will be able to use XSLT component of the ESB, which defines a transformational syntax well formed as an XML document for creating interoperability through the XML.

Middleware technologies provide an interface mechanism for inter-process and inter-application communications and as such could provide the bridging mechanism for non-eGIF compliant legacy environments. Web Services are a specific type of middleware that use XML-based protocols to provide non-proprietary inter-process communications.

The interface and protocol standards provided by middleware products provide an environment for processes and applications to communicate and share information. Middleware can also be used to 'wrap' applications so that they provide a consistent interface to other applications and processes. The use of middleware technologies will improve the ability to gain access to services provided by applications and processes stored and executed on other MDA environments. They provide the ability to encapsulate legacy applications so that they offer a standardised interface to other users of their services and increased support for interoperability between applications.

2.4. Develop Roadmap for National Compliance

Upon completion of the non-compliance confirmation exercise, a strategic roadmap for compliance must be developed. The drivers for developing such a roadmap will include priority levels of MDAs from a government's perspective, the data exchange requirements, availability of resources, etc.

From an implementation standpoint, the central authority will consider the following:

Current technologies, applications and information systems deployed by MDAs that do not need to immediately comply with the eGIF standards and policies;

How MDAs can use the Enterprise Architecture to drive their interoperability implementation plans;

From a defined date by the government, all new information systems, applications, interfacing and communications technologies deployed by MDAs (or current instances of systems being redeveloped or replaced) must comply with the eGIF except in instances where:

- o Interoperability is not considered by the MDA as a requirement for a given technology solution; or
- o the current version of the eGIF does not include policies and standards on the technologies the MDA wants to deploy; or
- o an alternative approach to achieving interoperability is justified;

Where an MDA has justifiable reason to be exempted from eGIF compliance it must:

- o Demonstrate to GICTeD or (the central standards authority) that the current eGIF version cannot meet given requirements or why an alternative approach to achieving interoperability is justified;
- o Provide suggestions for necessary changes to the eGIF.

Exemptions will only apply to a specific system or technology but not the entire ICT environment and business processes of the MDA;

Specialist systems deployed by the security and intelligence services are automatically exempted where compliance with the eGIF is considered inappropriate.

2.5. Seek Legislation to Mandate eGIF in Ghana

Government legislation will be required for the enforcement of eGIF standards and policies in Ghana and the law must clearly determine the date for MDAs to start the process of implementing the required structures in their organisations for compliance. The adoption of eGIF should be made an integral part of the MDAs plans to participate in electronic government and as such Chief Directors, Director Generals and Chief Executive Officers and other senior officials of the MDAs must integrate eGIF implementation requirements into their future strategic plans. The legislation however must be flexible to allow for the lack of technical expertise and funds for the MDAs to embark on large scale transformation activities.

2.6. Establish Committees and Working Groups

A successful implementation of eGIF depends on the establishment of committees and working groups to oversee the various management processes.

The **eGIF Advisory Board** must be set up to oversee eGIF as an independent body, separate from the domain Working Groups. The board must be seen as experts in the field of interoperability to ensure trust and work collaboratively with MDAs to ensure eGIF is maintained and used effectively across government. Other roles and responsibilities of the board include:

Promoting the use of eGIF standards and policies across government;

Monitoring eGIF usage and policing adherence to standards and policies;

Serving as an advisory body for the MDAs implementing their Enterprise Architecture to provide advice on how to ensure eGIF standards are incorporated into their future state architecture;

Providing the mechanisms for ensuring cross MDA interoperability and resolving issues associated with interoperability;

Meeting regularly to access, prioritise and plan changes. Board membership must include representatives appointed by the central government authority (GICTeD) from the public and private sectors;

Defining intellectual property rights constraints to prevent manipulation of standards by vendors for market dominance.

To maintain the eGIF the following Working Groups must be established to be responsible for all changes and updates to the various domains of the eGIF. This includes the management of standards, polices, specifications etc. The Working Group membership will comprise of selected individuals from the public sector, private organisations and industry subject matter experts all appointed by GICTeD.

Capacity building is an important objective of the eGhana project and as such it is critical that the Working Groups undertake efforts to disseminate information as well as to educate and train MDA staff on eGIF and its standards.

The following Working Groups must be formed:

Technical Standards & Policies - this group will be responsible for the coordination of all changes pertaining to the technical standards, specifications and policies defined in the eGIF. The primary role of this group is to assess and enforce technical interoperability. This group will also be responsible for studying industry standards as they are used and make the necessary recommendations for their use in Ghana.

XML Schemas - this group is responsible for setting of specifications, and the coordination of maintenance of the government XML Schemas. The group will develop and approve all schemas to be used across the public sector. They will advice and facilitate the development of common schemas across government. The group will be made up of experienced representatives across MDAs and the private sector with data management experience. All requests for changes and assessments to be carried out in

relation to the schemas will be handled by this group. All schemas reviewed and approved will be published on the eGIF website and made available for use.

Metadata Model - this group will provide advice on all aspects of the metadata model and will develop and maintain the metadata model across government.

Other Special Interest Groups - wherever necessary GICTeD will set up Working Groups on adhoc basis to formulate policies and standards for specific technical areas, including emerging technologies.

2.6.1. eGIF GOVERNANCE PROCESSES

For the GoG to gain maximum value from the eGIF process a governance model, which includes an governance processes and measurements for eGIF compliance must be established. eGIF governance processes will include:

Strategic planning – The process of developing an ICT strategy for an MDA. It enables the agency to transform to a desired future state where its investments in ICT are strategically aligned with the business, and it enables the business to meet its goals and objectives. This entails developing an Enterprise Architecture and incorporating eGIF standards and policies to ensure compliance. The planning horizon is typically three to five years.

Operational planning – The process of developing a plan that defines the programmes and projects for eGIF compliance. The planning horizon for operational planning is typically 3 months to two years. This includes the identification of areas of non-compliance and developing the appropriate solutions to enable compliance. Some of the projects could be considered as 'business as usual' and therefore and included in the strategic plans of the MDA.

Budget planning – The process of developing the budget that accompanies operational planning. Budget planning defines the financial boundaries for the programmes and projects required for eGIF compliance. The funding mechanisms of the MDAs must include the provision of concrete evidence for eGIF compliance prior to the approval of funds for projects.

Enterprise Architecture maintenance process – The process to update the Enterprise Architecture and associated assets and keep them current involves ensuring that eGIF standards and policies are incorporated into the future state Enterprise Architecture..

ICT policy management – The process concerned with the basis for decisions about acquiring and applying various technologies. In support of such decisions, the ICT policy identifies key technologies and describes how those technologies are advancing and how they are being applied to support business needs. The ICT policy also establishes guidelines or specifications to support selecting and integrating those technologies throughout the enterprise. Those guidelines must point to the eGIF.

Contract and vendor management – The process of setting the strategic long- and short-term view of the MDA's relationship with ICT product and service suppliers. The MDA's must ensure all vendors and suppliers are aware of the eGIF standards and policies and must ensure all solutions supplied confirm to the eGIF.

2.7. Deploy eGIF Web Site

The central government authority (GICTED) will deploy the main eGIF Web site, which will host the artefacts such as the XML Schemas, the standards, policies and metadata model. The site will also provide best-practice guidance, Frequently Asked Questions (FAQs), and advice on training and toolkits, and outline the management processes for keeping the eGIF up to date.

2.8. Start Corrective Activities for Compliance

The start of the actual transformation activities will depend on the roadmap and each MDA's own technology plans. However, government's own policies will dictate, which of the MDAs will start their compliance processes first. MDAs such as the Ghana Health Service and NHIS are prime candidates for early adoption of the standards because of the need to improve data interchange between them. Due to the immaturity state of the MDAs ICT environments, it is highly recommended that MDAs use the Enterprise Architecture to drive their eGIF compliance initiatives.

3. Oversight and Ownership of Issues

The eGIF will be generally owned by GICTeD or the central government authority responsible for ensuring compliance and maintenance of the eGIF. An eGIF Advisory Board will be responsible for resolving cross MDA eGIF issues and will work with the different Working Groups to manage the development, maintenance, monitoring and promotion of the standards policies and other key components. The roles of the Advisory Board and Working Groups are provided in eGIF Assessment Methodology document as well as the mechanisms to monitor upcoming standards and industry initiatives the version control process.

The ICT Director/CIO is responsible for eGIF compliance in the MDA and will ensure all issues related to eGIF are resolved internally but may have to escalate issues to the eGIF Advisory Board if the issue is considered to be of significant importance or has national implications. The ICT Director will also liaise with the central government authority to resolve inter-MDA eGIF issues.